



## DEPARTMENT OF ENERGY

### 10 CFR Part 430

[EERE-2022-BT-TP-0005]

RIN 1904-AF11

#### **Energy Conservation Program: Test Procedure for Uninterruptible Power Supplies**

**AGENCY:** Office of Energy Efficiency and Renewable Energy, Department of Energy.

**ACTION:** Notice of proposed rulemaking and announcement of public meeting.

**SUMMARY:** The U.S. Department of Energy (“DOE”) proposes to amend its test procedure for uninterruptible power supplies (“UPSs”) to consider the latest revision of the industry standard that is incorporated by reference and to provide an optional test method for measuring power consumption of a UPS at no-load conditions. DOE is seeking comment from interested parties on the proposal.

**DATES:** DOE will accept comments, data, and information regarding this proposal no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. See section V, “Public Participation,” for details.

DOE will hold a public meeting via webinar on Thursday, February 2, 2023, from 1:00 p.m. to 4:00 p.m. See section V, “Public Participation,” for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at [www.regulations.gov](https://www.regulations.gov) under docket number EERE–2022–BT–TP–0005. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2022–BT–TP–0005, by any of the following methods:

*Email:* [UPS2022TP0005@ee.doe.gov](mailto:UPS2022TP0005@ee.doe.gov). Include the docket number EERE–2022–BT–TP–0005 in the subject line of the message.

*Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc (“CD”), in which case it is not necessary to include printed copies.

*Hand Delivery/Courier:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L’Enfant Plaza, SW., 6<sup>th</sup> Floor, Washington, DC, 20024. Telephone: (202) 287-1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimiles (“faxes”) will be accepted. For detailed instructions on submitting comments and additional information on this process, see section V of this document.

*Docket:* The docket for this activity, which includes *Federal Register* notices, public meeting attendee lists and transcripts (if a public meeting is held), comments, and other supporting documents/materials, is available for review at [www.regulations.gov](http://www.regulations.gov). All documents in the docket are listed in the [www.regulations.gov](http://www.regulations.gov) index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

The docket webpage can be found at [www.regulations.gov/docket/EERE-2022-BT-TP-0005](http://www.regulations.gov/docket/EERE-2022-BT-TP-0005). The docket webpage contains instructions on how to access all documents, including public comments, in the docket. See section [V] for information on how to submit comments through [www.regulations.gov](http://www.regulations.gov).

## **FOR FURTHER INFORMATION CONTACT:**

Mr. Jeremy Domm, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-2J, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-9870. Email [ApplianceStandardsQuestions@ee.doe.gov](mailto:ApplianceStandardsQuestions@ee.doe.gov).

Ms. Kristin Koernig, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-3593. E-mail: [Kristin.koernig@hq.doe.gov](mailto:Kristin.koernig@hq.doe.gov).

For further information on how to submit a comment, review other public comments and the docket, or participate in a public meeting, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: [ApplianceStandardsQuestions@ee.doe.gov](mailto:ApplianceStandardsQuestions@ee.doe.gov).

## **SUPPLEMENTARY INFORMATION:**

DOE proposes to incorporate by reference the following industry standard into 10 CFR part 430:

IEC 62040-3, “Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements,” Edition 3.0, copyright April 2021.

Copies of IEC 62040-3 Ed. 3.0 are available from the International Electrotechnical Commission, 3 Rue de Varembe, Case Postale 131, 1211 Geneva 20, Switzerland; [webstore.iec.ch](http://webstore.iec.ch).

For a further discussion of this standard, see section IV.M of this document.

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## **I. Authority and Background**

UPSs are a class of battery chargers and fall among the consumer products for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6295(u)) DOE’s energy conservation standards and test procedure for UPSs are currently prescribed at title 10 of the Code of Federal Regulations (“CFR”), part 430 section 32(z)(3); and 10 CFR part 430, subpart B, appendix Y (“appendix Y”) and appendix Y1 (“appendix Y1”). The following sections discuss DOE’s authority to establish a test procedure for UPSs and relevant background information regarding DOE’s consideration of the test procedure for this product.

## *A. Authority*

The Energy Policy and Conservation Act, Pub. L. 94-163, as amended (“EPCA”),<sup>1</sup> authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B of EPCA<sup>2</sup> established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include UPSs, the subject of this document. (42 U.S.C. 6295(u))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of those consumer products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

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<sup>1</sup> All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A-1 of EPCA.

<sup>2</sup> For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use, and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

EPCA also requires that, at least once every seven years, DOE evaluate test procedures for each type of covered product, including UPSs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* the proposed test procedure and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedure. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such

information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)). If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedure. (42 U.S.C. 6293(b)(1)(A)(ii))

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure for the covered product, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (IEC) Standard 62301<sup>3</sup> and IEC Standard 62087<sup>4</sup> as applicable. (42 U.S.C. 6295(gg)(2)(A))

DOE is publishing this notice of proposed rulemaking (“NOPR”) in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6293(b)(1)(A))

### *B. Background*

On December 12, 2016, DOE amended its battery charger test procedure by publishing a final rule in the *Federal Register* that added a discrete test procedure for

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<sup>3</sup> IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

<sup>4</sup> IEC 62087, *Audio, video and related equipment—Methods of measurement for power consumption* (Edition 1.0, Parts 1–6: 2015, Part 7: 2018).

UPSs. 81 FR 89806 (“December 2016 Final Rule”). The December 2016 Final Rule incorporated by reference specific sections of the relevant industry standard for UPSs, with additional instructions, into the current battery charger test procedure published at appendix Y. 81 FR 89806, 89810

On September 8, 2022, DOE published a final rule in the *Federal Register* amending the existing test procedure at appendix Y for battery chargers and creating a new test procedure at appendix Y1 that expanded the scope of the battery charger test method to include open placement and fixed-position wireless battery chargers and established separate metrics for active mode, standby mode, and off mode for all battery chargers other than UPSs. 87 FR 55090 (“September 2022 Final Rule”). Manufacturers will be required to continue to use the amended test procedure in appendix Y until the compliance date of any new final rule establishing amended energy conservation standards based on the newly established test procedure in appendix Y1. 87 FR 55090, 55122. At such time that DOE establishes new standards for battery chargers other than UPSs using these new metrics, manufacturers would no longer use appendix Y and instead would be required to determine compliance using the updated test procedure at Y1. *Id.* at 87 FR 55125. That final rule also replicated all aspects of testing UPSs from appendix Y to appendix Y1, ensuring that instructions for all battery chargers are consolidated in one location. *Id.* at 87 FR 55125-55132.

On February 2, 2022, DOE initiated a rulemaking process to consider amendments to the UPS test procedure by publishing in the *Federal Register* a request for information (“RFI”) seeking data and information regarding the existing DOE test procedure for UPSs (“February 2022 RFI”). 87 FR 5742. On May 11, 2022, DOE issued



a correcting amendment to address an error in describing input dependency modes in the regulatory text as it appeared in the December 2016 Final Rule. 87 FR 28755.

DOE received comments in response to the February 2022 RFI from the interested parties listed in Table I.1.

**Table I.1 List of Commenters with Written Submissions in Response to the February 2022 RFI**

<b>Commenter(s)</b>	<b>Reference in this NOPR</b>	<b>Comment No. in the Docket</b>	<b>Commenter Type</b>
National Electrical Manufacturers Association	NEMA	2	Trade Association
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, Natural Resources Defense Council, New York State Energy Research and Development Authority	Joint Commenters	3	Efficiency Organizations
Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison; collectively, the California Investor-Owned Utilities	CA IOUs	4	Utility Association
Northwest Energy Efficiency Alliance	NEEA	5	Efficiency Organization

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.<sup>5</sup>

## **II. Synopsis of the Notice of Proposed Rulemaking**

In this NOPR, DOE proposes to amend appendices Y and Y1 as follows:

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<sup>5</sup> The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop a test procedure for UPSs. (Docket NO. EERE-2022-BT-TP-0005, which is maintained at [www.regulations.gov](http://www.regulations.gov)). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

- (1) Incorporate by reference the current revision to the applicable industry standard—IEC 62040-3 Ed. 3.0, “Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements”—to reflect redesignated subsections in the latest version of that standard.
- (2) Provide an optional test method for measuring the power consumption of UPSs at no-load conditions.

DOE’s proposed actions are summarized in Table II.1 compared to the current test procedure, with the reason for the proposed change also provided.

**Table II.1 Summary of Changes in Proposed Test Procedure Relative to Current Test Procedure**

<b>Current DOE Test Procedure</b>	<b>Proposed Test Procedure</b>	<b>Attribution</b>
References IEC 62040-3 Ed. 2.0	Updates each reference to IEC 62040-3 Ed. 3.0	To harmonize with the latest industry standard
Provides definitions for UPS, total harmonic distortion, and certain types of UPSs that differ non-substantively from the definitions in IEC 62040-3 Ed. 3.0	Harmonizes DOE definitions with definitions of UPS provided in IEC 62040-3 Ed. 3.0	To harmonize with the latest industry standard
Does not provide a method for testing the power consumption of UPSs at no-load conditions	Incorporates the no-load test from Annex J of IEC 62040-3, Ed. 3.0 as an optional test method for voluntary representations of no-load power consumption	To respond to comments received on the February 2022 RFI

Discussion of DOE’s proposed actions are addressed in detail in section III of this NOPR.

### **III. Discussion**

In the following sections, DOE proposes certain amendments to its test procedure for UPSs. For each proposed amendment, DOE provides relevant background

information, explains why the amendment merits consideration, discusses relevant public comments, and proposes a potential approach.

#### *A. Scope of Applicability*

The scope of the current test procedure at appendices Y and Y1, as applicable to UPSs, covers UPSs<sup>6</sup> that utilize the standardized National Electrical Manufacturer Association (“NEMA”) plug, 1-15P or 5-15P,<sup>7</sup> and have an alternating current (“AC”) output. Appendices Y and Y1, section 1.

In the February 2022 RFI, DOE sought comment on whether the scope of the test procedure as it pertains to UPSs is still appropriate or whether DOE should consider any changes in scope. 87 FR 5742, 5744.

NEMA commented that it did not see any need for changes to the UPS test procedure with regards to scope. (NEMA, No. 2 at p. 2)

Conversely, the Joint Commenters recommended that DOE investigate opportunities to expand the scope of the UPS test procedure to cover back-up battery chargers such as portable power systems. (Joint Commenters, No. 3 at p. 1) The Joint Commenters stated that portable power systems are an emerging class of products that are becoming increasingly common for homes given the need for back-up power in climate emergencies and power outage situations. (*Id.*) The Joint Commenters encouraged DOE to consider incorporating such products into the scope of the test procedure given the substantial potential for growth of these products in the market. (*Id.*)

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<sup>6</sup> As discussed further in section III.B of this document, DOE defines a UPS as a battery charger consisting of a combination of convertors, switches, and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of input power failure. Appendices Y and Y1, section 2.27.

<sup>7</sup> Plug designations are as specified in American National Standards Institute (“ANSI”)/NEMA WD 6-2016, incorporated by reference at 10 CFR 430.2.

NEEA similarly encouraged DOE to expand the scope of the battery charger test procedure to include portable power stations that utilize batteries and to test them using the appendix Y battery charger test instructions. (NEEA, No. 5 at p. 7) NEEA stated that its research reveals that consumer portable power stations are experiencing rapid market adoption. (*Id.*) NEEA provided examples of products with a range of battery capacities and charge with a home wall outlet. (*Id.*) NEEA described the primary consumer use for such products as providing emergency home power—which NEEA asserted is a growing need due to the increased frequency of electrical power outages associated with extreme weather conditions—as well as outdoor recreation applications. (*Id.* at p. 8) NEEA stated that consumer portable power systems appear to be excluded by DOE’s current test procedure, given that they are not strictly UPSs and may be considered within the definition of “backup battery chargers,”<sup>8</sup> which are explicitly omitted from the scope of appendix Y.<sup>9</sup> (*Id.*) Additionally, NEEA stated that it was not able to identify portable power stations listed in DOE’s battery charger or UPS compliance certification database (“CCD”). (*Id.*)

However, NEEA stated that its technical research supported addressing consumer portable power stations within the non-UPS portion of the test procedure and not the UPS portion because (1) they supply loads when not connected to the grid, whereas the UPS test procedure focuses on the efficiency of a continuously grid-connected system; (2) they have a variety of duty cycles, such that the variety of use scenarios is like other consumer chargers covered by the non-UPS portion of the test procedure; and (3) they have

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<sup>8</sup> DOE defines a “back-up battery charger” as a battery charger excluding UPSs: (1) that is embedded in a separate end-use product that is designed to continuously operate using mains power (including end-use products that use external power supplies); and (2) whose sole purpose is to recharge a battery used to maintain continuity of power in order to provide normal or partial operation of a product in case of input power failure. 10 CFR 430.2. More broadly, DOE defines a “battery charger” as a device that charges batteries for consumer products, including battery chargers embedded in other consumer products. *Id.*

<sup>9</sup> Section 1 of appendix Y (“Scope”) states that the appendix does not provide a method for testing back-up battery chargers.

different charge rates, and the battery charger test procedure already accommodates variations in charge rates. (*Id.* at pp. 8-9)

Relevant to consideration of these comments, the scope of DOE's battery charger test procedure includes all battery chargers operating at either direct current ("DC") or United States AC line voltage (115V at 60Hz). Appendix Y, section 1. To the extent that a portable power system meets the definition of a battery charger, operates on DC or United States AC line voltage, but does not meet the definition of a back-up battery charger as defined by DOE, such a product is currently covered within the scope of the non-UPS portion of the battery charger test procedure. Based on the descriptions of products described by NEEA, DOE tentatively concludes that such products may not meet the definition of "back-up battery charger" because they are not embedded in a separate end-use product. Rather, the power station itself is the end-use product and is not used to maintain power in the event of mains power failure. In contrast to NEEA's findings, DOE has identified—based on a review of product literature—a wide range of portable power stations currently certified as non-UPS battery chargers and listed in the CCD,<sup>10</sup> suggesting that manufacturers have determined that such products meet these criteria and are therefore covered within the scope of the non-UPS portion of the battery charger test procedure. Because such products are already included within the scope of the non-UPS battery charger test procedure, DOE has tentatively determined that no changes are warranted to the scope of the UPS test procedure with respect to such products.

To the extent that a portable power station meets DOE's definition of a back-up battery charger, such a product is currently outside the scope of appendices Y and Y1.

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<sup>10</sup> For example, DOE has identified the following inexhaustive list of portable power stations models in the battery charger CCD: Jackery 550, DEWALT DXAEP14, STANLEY J5C09, Anker A1710, Duracell PPS1000-1050-120-01.

As suggested by NEEA, DOE tentatively agrees that the operational characteristics of portable power stations that are not back-up battery chargers are in the scope of the non-UPS portion of the appendices Y and Y1 test procedure and not the UPS portion. Therefore, changes to the non-UPS portion of appendices Y and Y1 are outside the scope of this rulemaking and DOE is not proposing any changes to the UPS portion of appendices Y and Y1 to address such products.

The CA IOUs noted that the current scope of the UPS test procedure is limited to UPSs that use standard NEMA 1-15P/5-15P wall plugs<sup>11</sup> and recommended that DOE review current shipments of UPS and UPS-like products to determine if the current method for limiting scope still provides sufficient coverage for this product category. (CA IOUs, No. 4 at pp. 1-2) The CA IOUs stated that they have identified a range of whole-home backup and portable outdoor power delivery devices that are UPS-like, which may offer the potential for energy savings. (*Id.* at p. 2) According to the CA IOUs, shipments of these two products have rapidly expanded since DOE's previous rulemaking for the UPS product category. (*Id.*) The CA IOUs commented that these products are currently outside the scope of DOE's test procedure either because they cannot use NEMA 1-15P/5-15P wall plugs (*e.g.*, whole-home backup products), or they typically do not use NEMA 1-15P/5-15P wall plugs when in service (*e.g.*, portable power stations). (*Id.*)

DOE's initial review of the market for the types of products discussed by the CA IOUs confirms the CA IOUs' findings that such products either do not appear to meet the definition of a UPS and/or do not use NEMA 1-15P/5-15P wall plugs. In addition, DOE tentatively determines that the test conditions specified by the current UPS test procedure

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<sup>11</sup> Section 1 of appendix Y specifies that this appendix provides the test requirements used to measure the energy efficiency of UPSs that utilize the standardized NEMA plug, 1-15P or 5-15P, as specified in ANSI/NEMA WD 6-2016 (incorporated by reference, see §430.3) and have an AC output.

would not provide a representative measure of energy use or energy efficiency for such products. However, DOE has tentatively determined that the markets for whole-home backup devices and portable outdoor power delivery devices are still nascent, albeit growing, and currently lack widespread use among consumers. DOE is concerned that defining such technologies and addressing them in the UPS test procedure at this time could potentially restrict the development of these less mature technologies.

Furthermore, DOE does not have sufficient consumer usage data, nor have commenters provided any such information, that would be needed at this time to develop a test procedure that produces representative results for these products. For these reasons, DOE is not proposing to expand the scope of the UPS test procedure to include whole-home backup power systems or outdoor power delivery devices.

#### *B. Definitions*

As discussed, DOE defines a UPS as a battery charger consisting of a combination of convertors, switches, and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of input power failure. Appendices Y and Y1, section 2.27. This definition aligns with the definition of a UPS provided in IEC 62040-3 Ed. 2.0, which is currently incorporated by reference in appendices Y and Y1.

In the February 2022 RFI, DOE sought comment on whether the current definition for a UPS is still appropriate or whether DOE should consider an amended definition. 87 FR 5742, 5744.

NEMA commented that the definition of a UPS should be updated to align with IEC 62040-3 Ed. 3.0. (NEMA, No. 2 at p. 2) Specifically, NEMA recommended

amending the UPS definition to read “...maintaining continuity of *AC* load power in case of *AC* input power failure” [emphasis added]. (*Id.*)

DOE recognizes the benefit of harmonizing with the latest versions of industry standards where applicable and appropriate. DOE has tentatively determined that the addition of the term “AC” in the IEC 62040-3 Ed. 3.0 definition is consistent with the range of products that meet the current definition of a UPS and would not change the scope of products subject to the test procedure.<sup>12</sup> Therefore, DOE proposes to update its definition of a UPS to incorporate by reference the definition specified in IEC 62040-3 Ed. 3.0.

DOE requests comment on its proposal to harmonize its definition of a UPS with that of IEC 62040-3 Edition 3.0. Specifically, DOE requests comment on its tentative determination that such harmonization would not affect the current scope of the UPS test procedure.

NEMA also suggested that DOE adopt or harmonize several other definitions from IEC 62040-3 Ed. 3.0, specifically, total harmonic distortion (“THD”), voltage independent (“VI”) UPS, and voltage and frequency independent (“VFI”) UPS.<sup>13</sup> (NEMA, No. 2 at pp. 4-6)

Section 2.26 of appendices Y and Y1 defines THD, expressed as a percent, as the root mean square (“RMS”) value of an AC signal after the fundamental component is

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<sup>12</sup> DOE notes that use of NEMA 1-15P/5-15P wall plugs, as specified by the currently defined scope for UPSs, implies the use of AC input power.

<sup>13</sup> The comment from NEMA included a duplicate section regarding VFI UPS definitions. Based on the context of the discussion throughout NEMA’s comments, DOE presumes that NEMA intended to also include voltage and frequency dependent (“VFD”) UPSs among the suggested definitions for harmonization with IEC 62040-3 Ed. 3.0.



removed and interharmonic components are ignored, divided by the RMS value of the fundamental component. Section 3.5.49 of IEC 62040-3 Ed. 3.0 defines THD as the ratio of the RMS value of the sum of the harmonic components  $X_h$  of orders 2 to 40 to the RMS value of the fundamental component  $X_1$ , and also includes a mathematical formula accompanying this descriptive definition. The key difference between the definitions is that DOE refers to the RMS value of the AC signal, whereas the IEC 62040-3 Ed. 3.0 definition more narrowly specifies measuring the RMS value of harmonic components of order 2 through 40. DOE understands that, in measuring the RMS value of a signal, a laboratory would be required to determine the number of harmonics to include within the measurement. By specifying harmonic components of order 2 through 40, DOE tentatively concludes that the IEC definition may provide a more reproducible measurement among different laboratories compared to the current DOE definition, which requires a laboratory to determine which harmonic components to measure. For this reason, DOE proposes to update its definition of THD to incorporate by reference the definition specified in IEC 62040-3 Ed. 3.0.

DOE has carefully reviewed its definitions of VFD UPS,<sup>14</sup> VFI UPS,<sup>15</sup> and VI UPS<sup>16</sup> in comparison to the definitions provided in sections 5.3.4.2.2,<sup>17</sup> 5.3.4.2.3,<sup>18</sup> and 5.3.4.2.4,<sup>19</sup> respectively, of IEC 62040-3 Ed. 3.0. The IEC definitions closely align with the core capabilities described by the DOE definitions. However, DOE's definitions each include a "Note" that provides greater specificity regarding certain product characteristics than the definitions provided by IEC 62040-3 Ed. 3.0. For example, the Note to section 2.27.2 of appendices Y and Y1 (providing the definition for VFI UPS) specifies that, at a minimum, the VFI UPS produces an output voltage and frequency within the specified

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<sup>14</sup> Section 2.27.1 of appendices Y and Y1 defines VFD UPS as a UPS that produces an AC output where the output voltage and frequency are dependent on the input voltage and frequency. This UPS architecture does not provide corrective functions like those in voltage independent and voltage and frequency independent systems. The definition also includes a *Note* specifying that VFD input dependency may be verified by performing the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 2.0 and observing that, at a minimum, the UPS switches from normal mode of operation to battery power while the input is interrupted.

<sup>15</sup> Section 2.27.2 of appendices Y and Y1 defines VFI UPS as a UPS where the device remains in normal mode producing an AC output voltage and frequency that is independent of input voltage and frequency variations and protects the load against adverse effects from such variations without depleting the stored energy source. The definition also includes a *Note* specifying that VFI input dependency may be verified by performing the steady state input voltage tolerance test and the input frequency tolerance test in sections 6.4.1.1 and 6.4.1.2 of IEC 62040-3 Ed. 2.0, respectively, and observing that, at a minimum, the UPS produces an output voltage and frequency within the specified output range when the input voltage is varied by  $\pm 10$  percent of the rated input voltage and the input frequency is varied by  $\pm 2$  percent of the rated input frequency.

<sup>16</sup> Section 2.27.3 of appendices Y and Y1 defines VI UPS as a UPS that produces an AC output within a specific tolerance band that is independent of under-voltage or over-voltage variations in the input voltage without depleting the stored energy source. The output frequency of a VI UPS is dependent on the input frequency, similar to a voltage and frequency dependent system. The definition also includes a *Note* specifying that VI input dependency may be verified by performing the steady state input voltage tolerance test in section 6.4.1.1 of IEC 62040-3 Ed. 2.0 and ensuring that the UPS remains in normal mode with the output voltage within the specified output range when the input voltage is varied by  $\pm 10$  percent of the rated input voltage.

<sup>17</sup> Section 5.3.4.2.2 of IEC 62040-3 Ed. 3.0 specifies that a UPS classified as VFD shall protect the load from a complete loss of AC input power. The output of the VFD UPS is dependent on changes in voltage and frequency of the AC input power and is not intended to provide additional voltage corrective functions, such as those arising from the use of tapped transformers. VFD classification is verified when performing the test described in section 6.2.2.7.

<sup>18</sup> Section 5.3.4.2.3 of IEC 62040-3 Ed. 3.0 specifies that a UPS classified VI shall protect the load as required for VFD and also from under-voltage applied continuously to the input, and over-voltage applied continuously to the input. The output voltage of the VI UPS shall remain within declared voltage limits (provided by voltage corrective functions, such as those arising from the use of active and/or passive circuits). The manufacturer shall declare an output voltage tolerance band narrower than the input voltage tolerance band. VI classification is verified when performing the tests described in section 6.4.1.2. The definition also includes a *Note* specifying that the energy storage device does not discharge when the AC input power is within the input voltage tolerance band.

<sup>19</sup> Section 5.3.4.2.4 of IEC 62040-3 Ed. 3.0 specifies that a UPS classified VFI is independent of AC input power voltage and frequency variations as specified and declared in section 5.2 and shall protect the load against adverse effects from such variations without discharging the energy storage device. VFI classification is verified when performing the tests described in section 6.4.1.3.

output range even when the input voltage is varied by  $\pm 10$  percent of the rated input voltage and the input frequency is varied by  $\pm 2$  percent of the rated input frequency. Whereas the definition of VFI UPS in IEC 62040-3 Ed. 3.0 specifies the AC input power voltage tolerance bands to be the greater of  $\pm 10$  percent of the rated input voltage and what is declared by the manufacturer and the AC input power frequency to be the greater of  $\pm 2$  percent of the rated input frequency and what is declared by the manufacturer. Similarly, the Note to section 2.27.3 of appendices Y and Y1 (providing the definition for VI UPS) specifies an input voltage variation of  $\pm 10$  percent, whereas the corresponding definition in IEC 62040-3 Ed 3.0 specifies the voltage limits to be the greater of  $\pm 10$  percent of the rated input voltage and what is declared by the manufacturer.

DOE notes that there are scenarios where using the manufacturer declared limits may result in a different input dependency classification of a UPS when compared to that conducted using DOE's current input voltage tolerance limits. For example, a manufacturer that declares an input voltage tolerance limit of  $\pm 15$  percent for a VI basic model but could have a unit that is unable to maintain the required output when the input voltage is adjusted by more than 13 percent in real world testing. Per the IEC definition, this unit would fail the VI input dependency at the manufactured declared limits of  $\pm 15$  percent and therefore be classified as a VFD UPS (the highest input dependent UPS topology). However, the same unit when tested per DOE's current input voltage limits of  $\pm 10$  percent would continue to classify it as a VI.

To avoid such discrepancies, DOE proposes to harmonize its definitions of VFD UPS, VI UPS, and VFI UPSs with IEC 62040-3 Ed 3.0 but maintain the notes alongside each definition that currently establish the input voltage and frequency tolerance limits of  $\pm 10$  percent and  $\pm 2$  percent, respectively.

DOE notes that the section numbers of IEC 62040-3 Ed. 2.0 currently referenced by DOE's definitions have been updated to different section numbers in IEC 62040-3 Ed. 3.0. DOE proposes to update its definitions of VFD UPS, VI UPS, and VFI UPS to reference the corresponding updated section numbers within IEC 62040-3 Ed. 3.0.

DOE has initially determined that the proposed amended definitions would not substantively change the scope or applicability of the test procedure as compared to the current definitions.

DOE requests comment on its proposal to update its definitions of THD, VFD UPS, VI UPS, and VFI UPS to harmonize with the IEC 62040-3 Ed 3.0 definitions.

### *C. Updates to Industry Standards*

As discussed, the current UPS test procedure incorporates by reference certain sections of IEC 62040-3 Ed. 2.0 regarding test setup, input and output power measurement, and the optional determination of UPS architecture. Specifically:

- The definitions of VFD UPS, VFI UPS, and VI UPS in sections 2.27.1 through 2.27.3 of appendices Y and Y1 reference: (1) the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 2.0, which in turn references section 5.3.4 and Annex G of IEC 62040-3 Ed. 2.0; (2) the steady state input voltage tolerance test in section 6.4.1.1 of IEC 62040-3 Ed. 2.0, as a subsection to section 6.4.1, which in turn references sections 5.2.1 and 5.2.2.k of IEC 62040-3 Ed. 2.0; and (3) the input frequency tolerance test in section 6.4.1.2 of IEC 62040-3 Ed. 2.0, which in turn references sections 5.3.2.d and 5.3.2.3 of IEC 62040-3 Ed. 2.0.

- Section 4.2.1 of appendices Y and Y1 specifies configuring the UPS according to Annex J.2 [of Annex J] of IEC 62040-3 Ed. 2.0.
- Section 4.3.3 of appendices Y and Y1 specifies measuring input and output power according to section J.3 of Annex J of IEC 62040-3 Ed. 2.0.

Since publication of the December 2016 Final Rule, IEC has updated the IEC 62040-3 standard to its third edition (*i.e.*, IEC 62040-3 Ed. 3.0). The following paragraphs summarize the key changes from the second edition, based on DOE's initial review of the revised standard.

Section 4 of IEC 62040-3 Ed. 3.0 includes updates to various environmental conditions, such as the general test environment and operating conditions when testing UPSs. Appendices Y and Y1, however, do not refer to section 4 of the IEC 62040-3 standard but instead provide their own environmental and operating conditions for testing purposes. DOE has therefore determined that its test procedure for measuring the efficiency of UPSs will remain unaffected by the updates to section 4 of the IEC 62040-3 Ed. 3.0.

Section 5.2 of IEC 62040-3 Ed. 2.0 addresses UPS input specifications, such as the input voltage range, input frequency range, and total harmonic distortions during which the UPS under test must remain in the normal mode of operation. While an initial review of IEC 62040-3 Ed. 3.0 shows significant editorial changes to the sections that define these parameters, the remainder of the parameters remain unchanged. Similarly, section 5.3 of IEC 62040-3 Ed. 3.0 provides the minimum output specifications for UPSs that must be declared by manufacturers, such as its input dependency, rated output voltage and RMS output voltage tolerance band, rated frequency tolerance band, rated

output active and apparent power, total harmonic distortion, etc. As before, the majority of the changes to this section are editorial or a reorganization.

Section 6 of IEC 62040-3 Ed. 2.0 previously provided instructions for performing the AC input failure test (section 6.2.2.7), the steady-state input voltage tolerance test (section 6.4.1.1), and the input frequency tolerance test (section 6.4.1.2) that are used to classify the input dependency of a UPS as VI, VFD, or VFI. IEC 62040-3 Ed. 3.0 has since updated these subsections with the following changes: subsection titles and numbering have been updated to specifically refer to them as VI, VFD, and VFI input dependency tests; additional criteria have been added for meeting the VI, VFD, and VFI classifications; and a new test load condition at 0 percent (*i.e.*, no-load) has been added (see section III.E of this document for further discussion of a no-load test).

Additional updates to Annex J to IEC 62040-3 Ed. 3.0 require multi-mode UPSs to be tested at all dependency modes, whereas DOE's current test procedure explicitly requires UPSs to be tested at only their highest and lowest input dependency modes. Annex J has also been updated to allow manufacturers to test UPSs with functions or ports set to the lowest power-consuming mode or disconnected if they are not related to maintaining the energy storage device (*i.e.*, batteries) at full charge, along with added reporting requirements for manufacturers to report these features, interfaces, or ports that have been turned off or set to the lowest power-consuming mode. This updated clarification regarding additional features is similar to DOE's current test procedure, which requires UPSs to be tested with such features off or disconnected; however, DOE currently does not require manufacturers to report these manually switched-off features.

In the February 2022 RFI, DOE requested comment on the updates made to IEC 62040-3 Ed. 3.0 and on whether DOE should revise all or parts of its incorporation by reference to harmonize with these changes. 87 FR 5742, 5745. DOE also requested feedback on whether any of the specific updates found in the new IEC standard has the potential to alter the recorded efficiency of UPSs as currently measured by appendix Y. *Id.*

DOE received several comments regarding aligning its reporting requirements for UPSs with the requirements in the revised Annex J in IEC 62040-3 Ed. 3.0 in response to the February 2022 RFI. The Joint Commenters, NEEA, and NEMA all requested that DOE require manufacturers to report which (if any) additional functionality was switched off for testing. (Joint Commenters, No. 3 at p. 2; NEEA, No. 5 at p. 7; NEMA, No. 2 at p. 4). NEMA commented that adding free text fields in the certification database spreadsheet template would reduce the reporting burden of uploading additional supplementary documentation to provide this information. (NEMA, No. 2 at p. 4) Additionally, NEEA noted that collecting this information increases stakeholder transparency and provides DOE with useful information for future analyses. (NEEA, No. 5 at p. 7)

DOE is not proposing to amend the certification or reporting requirements for UPSs in this NOPR. Instead, DOE may consider proposals to amend the certification requirements and reporting for UPSs under a separate rulemaking regarding appliance and equipment certification.

In response to the February 2022 RFI, NEMA suggested that DOE incorporate the 15-minute accumulated energy measurement method found in Annex J of IEC 62040-3

Ed. 3.0, commenting that it is the measurement method favored by DOE because DOE already includes such a method in appendices Y and Y1. (NEMA, No. 2 at p. 2) NEMA also recommended that DOE incorporate sections 5.2 and 5.3 of IEC 62040-3 or the entire standard and stated that doing so would not alter the measured efficiency of UPSs. (*Id.* at p. 3)

DOE has carefully reviewed IEC 62040-3 Ed. 3.0 as it relates to measuring the efficiency of a UPS. DOE has tentatively determined that the relevant updates to IEC 62040-3 Ed. 3.0 compared to IEC 62040-3 Ed. 2.0 are largely editorial, including renumbering of certain sections referenced by the DOE test procedure, and that updating DOE's existing references to IEC 62040-3 Ed. 3.0 would not alter the measured efficiency of basic models. As a result, DOE proposes to update its incorporation by reference of IEC 62040-3 Ed. 2.0 to IEC 62040-3 Ed. 3.0 in 10 CFR 430.3 and to update its references in appendices Y and Y1 accordingly to reflect the renumbering of sections in IEC 62040-3 Ed. 3.0.

As stated by NEMA in its written comment, DOE's existing test procedure for UPSs already allows recording of either instantaneous power or accumulated energy over a 15-minute period. DOE's review of Annex J in IEC 62040-3 Ed. 3.0 did not reveal any additional instructions that would further facilitate the use of the accumulated energy method. As such, DOE is not proposing any changes to its existing language in section 4.3.3 of appendices Y and Y1.

DOE requests comment on its proposal to incorporate by reference IEC 62040-3 Ed 3.0 and to update references in appendices Y and Y1 accordingly to reflect the renumbering of sections in IEC 62040-3 Ed 3.0.



#### *D. Loading Conditions*

Section 4.3.3 of appendices Y and Y1 requires that the efficiency of a UPS be measured at 100, 75, 50, and 25 percent of the device's rated output power. Each of these measured efficiencies is weighted according to values provided in Table 4.3.1 of appendices Y and Y1 and combined to determine a single weighted average output metric (*i.e.*, the average load adjusted efficiency) representing the UPS's overall efficiency. These load conditions and weightings were established in the December 2016 Final Rule consistent with the load weightings specified in ENERGY STAR UPS Specification Version 1.0.<sup>20</sup> 81 FR 89806, 89816. The current ENERGY STAR UPS Specification Version 2.0<sup>21</sup> maintains these same load conditions and weightings. These load conditions and weightings are also consistent with those specified in section 6.4.1.6 of IEC 62040-3 Ed. 2.0 and section 6.4.1.9 of IEC 62040-3 Ed. 3.0.

In the February 2022 RFI, DOE requested comment on whether the UPS load weightings specified in Table 4.3.1 are representative of current UPS usage patterns. 87 FR 5742, 5746. DOE also requested data on the consumer usage profile of UPSs with respect to each architecture (*i.e.*, VFD, VI, and VFI). *Id.*

NEEA, the Joint Commenters, and the CA IOUs all recommended introducing a fifth loading test condition at 10 percent of the device's rated output power, asserting that such a loading condition is more representative of desktop computers and other loads typically protected by UPSs. They further asserted that adding a 10-percent loading condition to UPS testing, along with a revised load weighting, would provide a more

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<sup>20</sup> The ENERGY STAR UPS Specification Version 1.0 is available at [www.energystar.gov/products/spec/uninterruptible\\_power\\_supplies\\_specification\\_version\\_1\\_0\\_pd](http://www.energystar.gov/products/spec/uninterruptible_power_supplies_specification_version_1_0_pd)

<sup>21</sup> The ENERGY STAR UPS Specification Version 2.0 is available at [www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Uninterruptible%20Power%20Supplies%20Final%20Version%202.0%20Specification\\_1.pdf](http://www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Uninterruptible%20Power%20Supplies%20Final%20Version%202.0%20Specification_1.pdf)

accurate efficiency value. (NEEA, No. 5 at pp. 1-4; Joint Commenters, No. 3 at pp. 1-2; CA IOUs, No. 4 at pp. 2-3)

NEMA, however, advised against adding a 10-percent loading condition and adjusting the loading level weights without significant evidence to support making such adjustments, arguing that DOE should maintain harmonization with IEC 62040-3 Ed. 3.0. NEMA further asserted that additional load test points are mathematically unnecessary and would invalidate testing already performed, which would impose a significant burden on manufacturers with no tangible benefits. NEMA further commented that mathematical loss models can be used to accurately predict UPS efficiency at any load point based on the five measurements already required by the DOE test procedure. (NEMA, No. 2 at p. 6)

As discussed, EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results that measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use, and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) As such, DOE must weigh the representativeness of test results with the associated test burden in evaluating any amendments to its test procedures. Regarding the representativeness of the DOE test procedure, the commenters have not provided specific data, nor is DOE aware of any specific data, demonstrating that a 10-percent loading condition would produce a more representative measure of energy use or energy efficiency of UPSs. In addition, DOE's test procedure does not differentiate between specific end-use applications. Therefore, load profiles specific to certain applications (*e.g.*, desktop computers) may not be representative of overall average use of UPSs across all end-use applications. Further, were DOE to consider a

10-percent load condition, DOE is not aware of any data to suggest what corresponding weighting factor should be used to combine this loading condition with the other defined loading conditions comprising the overall efficiency metric.

Regarding test burden, as noted, the loading points currently specified in appendices Y and Y1 are consistent with the loading points defined by ENERGY STAR, as well as section 6.4.1.6 of IEC 62040-3 Ed. 3.0. DOE also notes that the requirements of IEC 62040-3 Ed. 3.0 are referenced by the European Union Code of Conduct on Energy Efficiency and Quality of AC UPSs Version 2.0.<sup>22</sup> Like many other types of consumer electronics, UPSs are manufactured and distributed globally by multi-national suppliers; as such, any differences between the DOE test procedure (applicable to products sold or imported into the United States) and internationally-recognized industry test methods impose a burden that is acutely impactful to the consumer electronics industry.

Having weighed the potential improvement to representativeness against the potential for increased test burden associated with adding a required 10-percent loading condition that would be applicable to all UPSs, DOE has tentatively concluded—based on information currently available—that the potential burden would outweigh any potential improvement in representativeness; *i.e.*, would introduce undue test burden. Consequently, DOE is not proposing to modify its existing loading points, weightings, or overall efficiency metric in this NOPR.

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<sup>22</sup> The European Union Code of Conduct on Energy Efficiency and Quality of AC UPSs Version 2.0 is available at [e3p.jrc.ec.europa.eu/publications/code-conduct-energy-efficiency-and-quality-ac-uninterruptible-power-systems-ups-0](http://e3p.jrc.ec.europa.eu/publications/code-conduct-energy-efficiency-and-quality-ac-uninterruptible-power-systems-ups-0).

DOE requests comment on its proposal to not modify the existing loading points, weighting, or the overall efficiency metric in the current UPS test procedure.

#### *E. No-Load Test*

DOE's test procedure for UPSs does not currently specify a method for determining the energy consumption of a UPS at no-load (*i.e.*, 0 percent loading condition). As discussed in section III.C of this NOPR, IEC 62040-3 Ed. 3.0 adds a new test load condition at 0 percent (*i.e.*, no-load) at section 6.4.1.10. In addition, ENERGY STAR UPS Specification Version 2.0 specifies testing at a 0-percent load condition, and the resulting power measurement (in Watts) is one of the required reported values. In the February 2021 RFI, DOE requested information on whether incorporating the additional no-load test has the potential to cause currently reported UPS input-dependency classifications to change.

In response to the February 2022 RFI, the Joint Commenters recommended that DOE incorporate the no-load test condition into its UPS test procedure and establish a separate standby mode metric based on the no-load test condition. The Joint Commenters asserted that a standby mode measurement at the no-load test condition would provide consumers with a more accurate understanding of UPS energy consumption and would align DOE's UPS test procedure more closely with DOE's external power supply ("EPS") and battery charger test procedures. The Joint Commenters asserted that the no-load condition of a UPS aligns closely with battery charger maintenance mode—in which a battery charger is connected to a battery and provides some limited charging in order to maintain the battery at full charge—and that because DOE determined that battery charge

maintenance mode qualifies under EPCA's definition of standby mode,<sup>23</sup> that it would be appropriate for DOE to establish a standby metric for UPSs based on the no-load test condition. (Joint Commenters, No. 3 at p. 3)

NEEA also encouraged DOE to add a no-load test condition to the UPS test procedure. NEEA asserted that UPSs operate at no-load or low-load when attached equipment, such as desktop computers, are powered off or running in sleep or idle modes; that relevant studies suggest that desktop computers spend much of their time powered off or in sleep or idle modes; and that the substantial differences in no-load input power across UPS models suggest a significant energy savings opportunity. (NEEA, No. 5 at pp. 1-2) Based on its analysis of cited research, NEEA concluded that a no-load condition would effectively represent desktop computer off and sleep modes. (*Id.* at 2) NEEA encouraged DOE to require reporting of UPS no-load power draw separately from the current active mode efficiency because the no-load measurement would be a power value rather than a percent efficiency, and that such an approach would harmonize with DOE's no-load approach for EPSs, battery chargers, and ENERGY STAR's approach for UPSs. (NEEA, No. 5 at pp. 4-5)

DOE recognizes the usefulness of a no-load power consumption metric to the industry and stakeholders, as evidenced by the inclusion of a no-load test in IEC 62040-3 Ed. 3.0, its inclusion as a reporting requirement for the ENERGY STAR UPS Specification Version 2.0, and comments from interested parties in response to the February 2021 RFI. For these reasons, DOE proposes to incorporate by reference the no-load test condition specified in section 6.4.1.10 of IEC 62040-3 Ed. 3.0 as a test in

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<sup>23</sup> The Joint Commenters cited DOE's battery charger test procedure NOPR published November 23, 2021. 86 FR 66878. DOE subsequently published a battery charger test procedure final rule on September 8, 2022, which includes a maintenance mode test for battery chargers. 87 FR 55090.

section 4.3.3 of appendices Y and Y1 that would be used as the basis for any representations of no-load power consumption. However, DOE notes that manufacturers will not be required to certify no-load power consumption to DOE as a result of this proposal because the energy conservation standards for UPSs do not have a no-load requirement at this time.

DOE requests feedback on its proposal to add a method for measuring the power consumption of UPSs at no-load as a test to be used as the basis for any representations of no-load power consumption.

#### *F. Reference Test Load*

DOE's test procedure refers to the 25, 50, 75, and 100-percent loads as "reference test loads." In general, test loads for testing consumer electronics can be either linear<sup>24</sup> or non-linear<sup>25</sup> in nature.

While IEC 62040-3 Ed. 2.0 provides a definition for reference test load,<sup>26</sup> it does not explicitly address whether such a test load is linear or non-linear in nature. Section 2.24 of appendices Y and Y1 defines "reference test load" as a load or condition with a power factor of greater than 0.99 in which the AC output socket of the UPS delivers the active power (W) for which the UPS is rated. By specifying a power factor requirement of greater than 0.99, DOE's current definition necessitates the use of a test load that is both linear and resistive.

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<sup>24</sup> IEC 62040-3 Ed 3.0 defines a linear load as a load wherein the load impedance is a constant.

<sup>25</sup> IEC 62040-3 Ed 3.0 defines a non-linear load as a load wherein the load impedance is a variable dependent on other parameters, such as voltage or time.

<sup>26</sup> IEC 62040-3 Ed. 2.0 defines "reference test load" as a load or condition in which the output of the UPS delivers the active power (W) for which the UPS is rated.

In response to the February 2022 RFI, NEEA recommended that to improve the representativeness of the UPS test procedure, DOE should require active mode testing employing the non-linear load specified in Annex E of IEC 62040-3 Ed. 3.0. NEEA stated that nearly all UPS loads are non-linear (*i.e.*, non-resistive) and have a power factor of less than one. NEEA explained that these non-linear loads increase current flows through the UPS, resulting in more losses and producing more heat. NEEA stated that manufacturers design UPSs to account for these types of loads, but that DOE's test procedure does not currently require non-linear loads in its efficiency measurements. (NEEA, No. 5 at p. 6)

Section D.2 in Annex D of IEC 62040-3 Ed. 3.0 explains that the diversity of types of load equipment and their relevant characteristics are always changing with technology. For this reason, the UPS output performance is characterized by loading with passive reference loads to simulate, as far as practical, the expected load types, but it cannot be taken that these load types are totally representative of the actual load equipment in a given application. The UPS industry has generally specified UPS output characteristics under conditions of linear loading, *i.e.*, resistive or resistive/inductive. The effect on the output of the UPS by non-linear loads both in steady state and dynamic is, in many cases, to cause deviation from the output characteristic specified by the manufacturer/supplier where these are quoted under linear load conditions.

While DOE recognizes that loads protected by UPSs can be non-linear, the use of non-linear loads for testing may create certain challenges or difficulties in meeting the specified test conditions, as described within section D.2 of IEC 62040-3 Ed. 3.0. This suggests that testing with non-linear loads may produce results that are less repeatable or reproducible than testing with linear loads. DOE has no information, nor have

commenters provided any information, about how the use of non-linear loads for UPS testing may affect repeatability, reproducibility, or test burden. As a result, DOE is not proposing the use of non-linear test loads for testing UPSs at this time.

#### *G. Error Corrections*

At the time of the February 2022 RFI, paragraph (a) of section 4.2.1 of appendices Y and Y1, “UPS Operating Mode Conditions,” stated that if the UPS can operate in two or more distinct normal modes as more than one UPS architecture, conduct the test in its lowest input dependency as well as in its highest input dependency mode where VFD represents the *lowest* [emphasis added] possible input dependency, followed by VI and then VFI.

NEMA stated that specifying the “lowest” possible input dependency is a typographical error, and that VFD represents the highest possible input dependency rather than the lowest. (NEMA, No. 2 at p. 3) In a correcting amendment published May 11, 2022, DOE acknowledged that the text in paragraph (a) of section 4.2.1 of appendix Y erroneously identifies VFD as the lowest input dependency, whereas it is in fact the highest input dependency as identified in the referenced Annex J.2 of IEC 62040-3 Ed 2.0. 87 FR 28755, 28755. DOE corrected this error in the text by replacing the erroneous word “lowest” with “highest.” *Id.* As a result, DOE is not proposing any changes to that corrected text in this NOPR.

#### *H. Test Procedure Costs and Harmonization*

##### *1. Test Procedure Costs and Impact*

EPCA requires that test procedures proposed by DOE not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) In this NOPR, DOE proposes to amend the existing



test procedure for UPSs by updating the industry standard incorporated by reference to its latest version, updating definitions consistent with the latest version of the industry standard, and introducing an optional test for measuring the power consumption of UPSs at no-load conditions. DOE has tentatively determined that these proposed amendments would not be unduly burdensome for manufacturers to conduct.

The proposed update to the latest version of the industry standard would not change the method of testing UPSs, but rather would only make non-substantive changes, such as section renumbering. The proposed amendments to harmonize certain definitions with the industry standard would not change the scope of products currently subject to the DOE test procedure or energy conservation standards. And the proposed test procedure for measuring the power consumption of UPSs at no-load conditions would not be required for demonstrating compliance with standards. Therefore, the proposed amendments will not alter the measured energy efficiency or energy use of UPSs. Manufacturers will be able to rely on data generated under the current test procedure. Further, the proposed changes would not require the purchase of additional equipment or increase test burden, and consequently would not impact testing costs. If manufacturers elected to continue to make representations or begin making representations regarding UPS power consumption at no-load conditions, they may need to retest the standby power portion of the test procedure for their UPS model. DOE estimates that this retest would cost approximately \$1,700 per unit if the test is conducted by a third-party lab and substantially less if done by the manufacturer themselves. However, as stated previously, any representations from such a retest would not be required for demonstrating compliance with standards.

## 2. Harmonization with Industry Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA), or estimated operating costs of that product during a representative average use cycle or period of use. Section 8(c) of appendix A of 10 CFR part 430 subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures, DOE will make modifications through the rulemaking process to these standards as the DOE test procedure.

The test procedure for UPSs at appendices Y and Y1 currently incorporates by reference IEC 62040-3 Ed. 2.0 regarding test setup, input and output power measurement, and the optional determination of UPS architecture. DOE is proposing to incorporate by reference the latest version of this industry standard (*i.e.*, IEC 62040-3 Ed. 3.0). Additional discussion of this proposed update is provided in section III.B of this document.

DOE requests comment on the benefits and burdens of the proposed updates and additions to the industry standard referenced in the test procedure for UPSs.

### *I. Compliance Date*

EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 180 days after publication of such a test procedure final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2))

If DOE were to publish an amended test procedure, EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

DOE also recognizes that the publication of two separate final rules (the September 2022 Final Rule amending the test procedure for battery chargers that are not UPSs and a potential future test procedure final rule for UPSs, if DOE were to publish an amended test procedure) amending the battery charger test procedures at appendix Y could cause confusion as to what version of these appendices is required to be used when making a representation. A further complication is that the September 2022 Final Rule created a new test procedure at appendix Y1 that expanded the scope of the battery charger test method and established a new multi-metric approach for all battery chargers other than UPSs. Manufacturers will be required to continue to use the amended test procedure in appendix Y until the compliance date of amended energy conservation standards for battery chargers established by an energy conservation standard final rule at some point in the future. Only upon the compliance date of amended energy conservation standards for battery chargers will manufacturers be required to begin using the test procedure in appendix Y1.

The September 2022 Final Rule amended appendix Y requiring manufacturers of battery chargers to use this recently updated version beginning March 7, 2023. While the sections in appendix Y that apply to UPSs remained unchanged by the September 2022 Final Rule, UPS manufacturers are required to use the version of appendix Y, as modified

by the September 2022 Final Rule, beginning on March 7, 2023. Because there are no differences in how a UPS is tested between the two versions of appendix Y, DOE tentatively concludes that it would be preferable to refer to the same version of the Appendix (as finalized by the September 2022 Final Rule) for testing both battery chargers and UPSs, even though the UPS testing provisions remain unchanged. DOE also concludes that presenting these various compliance dates and references to different versions of the appendices in a tabular format would be more effective. Accordingly, in this NOPR, DOE is proposing to update the notes section at the beginning of appendices Y and Y1 to include a table that clearly identifies the appropriate appendix reference and compliance dates for each product.

#### **IV. Procedural Issues and Regulatory Review**

##### *A. Review Under Executive Orders 12866 and 13563*

Executive Order (“E.O.”) 12866, “Regulatory Planning and Review,” as supplemented and reaffirmed by E.O. 13563, “Improving Regulation and Regulatory Review,” 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt;

and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (“OIRA”) in the Office of Management and Budget (“OMB”) has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this proposed regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit “significant regulatory actions” to OIRA for review. OIRA has determined that this proposed regulatory action does not constitute a “significant regulatory action” under section 3(f) of E.O. 12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

#### *B. Review Under the Regulatory Flexibility Act*

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (“IRFA”) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made

its procedures and policies available on the Office of the General Counsel's website: [www.energy.gov/gc/office-general-counsel](http://www.energy.gov/gc/office-general-counsel). DOE reviewed this proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003.

For manufacturers of UPSs, the Small Business Administration ("SBA") has set a size threshold, which defines those entities classified as "small businesses" for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. *See* 13 CFR part 121. The size standards are listed by the North American Industry Classification System ("NAICS") code and industry description and are available at [www.sba.gov/document/support--table-size-standards](http://www.sba.gov/document/support--table-size-standards). Manufacturing of UPSs is classified under NAICS 335999, "All Other Miscellaneous Electrical Equipment and Component Manufacturing." The SBA sets a threshold of 500 employees or less for an entity to be considered as a small business for this category.

To estimate the number small businesses that manufacture UPSs impacted by this rulemaking, DOE conducted a survey using information from DOE's Compliance Certification Database and previous rulemakings. DOE used information from these sources to create a list of companies that potentially manufacture or sell UPSs. DOE screened out companies that do not offer products covered by this rulemaking, do not meet the definition of a "small business," or are foreign owned and operated. DOE identified five companies that are small businesses manufacturing UPSs covered by this rulemaking.

However, DOE has tentatively concluded that the proposed updates to DOE's test procedure for UPSs do not involve substantive changes to the test setup and methodology and will not pose any additional test burden or additional test costs for any UPS manufacturers, large or small.

Therefore, DOE tentatively concludes that the impacts of the test procedure amendments proposed in this NOPR would not have a “significant economic impact on a substantial number of small entities,” and that the preparation of an IRFA is not warranted. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

### *C. Review Under the Paperwork Reduction Act of 1995*

Manufacturers of UPSs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including UPSs. (*See generally* 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (“PRA”). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

DOE is not proposing to amend the certification or reporting requirements for UPSs in this NOPR. Instead, DOE may consider proposals to amend the certification requirements and reporting for UPSs under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910-1400 at that time, as necessary.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

#### *D. Review Under the National Environmental Policy Act of 1969*

In this NOPR, DOE proposes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for UPSs. DOE has determined that this proposed rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

#### *E. Review Under Executive Order 13132*

Executive Order 13132, "Federalism," 64 FR 43255 (Aug. 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires



agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

#### *F. Review Under Executive Order 12988*

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a

clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

*G. Review Under the Unfunded Mandates Reform Act of 1995*

Title II of the Unfunded Mandates Reform Act of 1995 (“UMRA”) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at

[www.energy.gov/gc/office-general-counsel](http://www.energy.gov/gc/office-general-counsel). DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

#### *H. Review Under the Treasury and General Government Appropriations Act, 1999*

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

#### *I. Review Under Executive Order 12630*

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights,” 53 FR 8859 (March 18, 1988), that this proposed regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

#### *J. Review Under Treasury and General Government Appropriations Act, 2001*

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB’s guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE’s guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at

[www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf](http://www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf). DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

#### *K. Review Under Executive Order 13211*

Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A “significant energy action” is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of UPSs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

*L. Review Under Section 32 of the Federal Energy Administration Act of 1974*

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; “FEAA”) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (“FTC”) concerning the impact of the commercial or industry standards on competition.

The proposed modifications to the test procedure for UPSs would incorporate testing methods contained in certain sections of the following commercial standard: IEC 62040-3 Ed. 3.0. DOE has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (*i.e.*, whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE will consult with both the Attorney General and the Chairman of the FTC concerning the impact of this test procedure on competition, prior to prescribing a final rule.

*M. Description of Materials Incorporated by Reference*

IEC 62040-3 Ed. 3.0, “Uninterruptible power systems (UPS)—Part 3: Method of specifying the performance and test requirements” is an industry-accepted test standard that specifies methods for measuring the efficiency of a UPS. The test procedure proposed in this NOPR updates all references from the previous edition (IEC 62040-3 Ed.

2.0) to this most current edition (IEC 62040-3 Ed. 3.0). IEC 62040-3 Ed. 3.0 is readily available from ANSI at *webstore.ansi.org*.

In this NOPR, DOE proposes to add a new section 0 (Incorporation by Reference) to both appendices Y and Y1 listing the applicable sections of IEC 62040-3 Ed. 3.0 that are referenced by the test procedure.

## **V. Public Participation**

### *A. Participation in the Webinar*

The time and date of the webinar meeting are listed in the **DATES** section at the beginning of this document. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website: *www.energy.gov/eere/buildings/public-meetings-and-comment-deadlines*. Participants are responsible for ensuring their systems are compatible with the webinar software.

### *B. Procedure for Submitting Prepared General Statements for Distribution*

Any person who has an interest in the topics addressed in this document, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Such persons may submit to *ApplianceStandardsQuestions@ee.doe.gov*. Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this proposed rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

### *C. Conduct of the Webinar*

DOE will designate a DOE official to preside at the webinar/public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the webinar/public meeting. There shall not be discussion of proprietary information, costs or prices, market share, or other commercial matters regulated by U.S. anti-trust laws. After the webinar/public meeting and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The webinar will be conducted in an informal, conference style. DOE will present a general overview of the topics addressed in this proposed rulemaking, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this proposed rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this proposed rulemaking. The official conducting the webinar/public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will

announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the webinar/public meeting.

A transcript of the webinar will be included in the docket, which can be viewed as described in the *Docket* section at the beginning of this document. In addition, any person may buy a copy of the transcript from the transcribing reporter.

#### *D. Submission of Comments*

DOE will accept comments, data, and information regarding this proposed rule before or after the public meeting, but no later than the date provided in the **DATES** section at the beginning of this proposed rule.<sup>27</sup> Interested parties may submit comments, data, and other information using any of the methods described in the **ADDRESSES** section at the beginning of this document.

*Submitting comments via [www.regulations.gov](http://www.regulations.gov).* The [www.regulations.gov](http://www.regulations.gov) webpage will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information

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<sup>27</sup> DOE has historically provided a 75-day comment period for test procedure NOPRs pursuant to the North American Free Trade Agreement, U.S.-Canada-Mexico (“NAFTA”), Dec. 17, 1992, 32 I.L.M. 289 (1993); the North American Free Trade Agreement Implementation Act, Pub. L. 103-182, 107 Stat. 2057 (1993) (codified as amended at 10 U.S.C.A. 2576) (1993) (“NAFTA Implementation Act”); and Executive Order 12889, “Implementation of the North American Free Trade Agreement,” 58 FR 69681 (Dec. 30, 1993). However, on July 1, 2020, the Agreement between the United States of America, the United Mexican States, and the United Canadian States (“USMCA”), Nov. 30, 2018, 134 Stat. 11 (*i.e.*, the successor to NAFTA), went into effect, and Congress’s action in replacing NAFTA through the USMCA Implementation Act, 19 U.S.C. 4501 *et seq.* (2020), implies the repeal of E.O. 12889 and its 75-day comment period requirement for technical regulations. Thus, the controlling laws are EPCA and the USMCA Implementation Act. Consistent with EPCA’s public comment period requirements for consumer products, the USMCA only requires a minimum comment period of 60 days. Consequently, DOE now provides a 60-day public comment period for test procedure NOPRs.



to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment itself or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Otherwise, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (“CBI”)). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

*Submitting comments via email, hand delivery/courier, or postal mail.* Comments and documents submitted via email, hand delivery/courier, or postal mail also will be posted to *www.regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying

documents. Instead, provide your contact information in a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No telefacsimiles (“faxes”) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English, and that are free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

*Campaign form letters.* Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters’ names compiled into one or more PDFs. This reduces comment processing and posting time.

*Confidential Business Information.* Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

*E. Issues on Which DOE Seeks Comment*

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

- (1) DOE requests comment on its proposal to harmonize its definition of a UPS with that of IEC 62040-3 Edition 3.0. Specifically, DOE requests comment on its tentative determination that such harmonization would not affect the current scope of the UPS test procedure.
- (2) DOE requests comment on its proposal to update its definitions of THD, VFD UPS, VI UPS, and VFI UPC to harmonize with the IEC 62040-3 Ed 3.0 definitions.
- (3) DOE requests comment on its proposal to incorporate by reference IEC 62040-3 Ed 3.0 and to update references in appendices Y and Y1 accordingly to reflect the renumbering of sections in IEC 62040-3 Ed 3.0.
- (4) DOE requests comment on its proposal to not modify the existing loading points, weighting, or the overall efficiency metric in the current UPS test procedure.
- (5) DOE requests feedback on its proposal to add a method for measuring the power consumption of UPSs at no-load as a test to be used as the basis for any representations of no-load power consumption.
- (6) DOE requests comment on the benefits and burdens of the proposed updates and additions to the industry standard referenced in the test procedure for UPSs.

Additionally, DOE welcomes comments on other issues relevant to the conduct of this rulemaking that may not specifically be identified in this document.

## **VI. Approval of the Office of the Secretary**

The Secretary of Energy has approved publication of this notice of proposed rulemaking and announcement of public meeting.

### **List of Subjects in 10 CFR Part 430**

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

### **Signing Authority**

This document of the Department of Energy was signed on December 16, 2022, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on December 19, 2022.

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Treena V. Garrett  
Federal Register Liaison Officer,  
U.S. Department of Energy



For the reasons stated in the preamble, DOE is proposing to amend part 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

**PART 430 -- ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS**

1. The authority citation for part 430 continues to read as follows:

**Authority:** 42 U.S.C. 6291-6309; 28 U.S.C. 2461 note.

2. Amend § 430.3 by revising paragraph (p)(4) to read as follows:

**§430.3 Materials incorporated by reference.**

\* \* \* \* \*

(p) \* \* \*

(4) IEC Standard 62040-3 Ed. 3.0 (“IEC 62040-3 Ed. 3.0”) Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements, Edition 3.0, 2011-03; IBR approved for appendices Y and Y1 to subpart B.

\* \* \* \* \*

3. Appendix Y to subpart B of part 430 is amended by:

- a. Revising the introductory note;
- b. Adding section 0;
- c. Revising sections 2.26, 2.27, 2.27.1, 2.27.2, and 2.27.3;
- d. Revising the introductory text of section 4.2.1;
- e. Revising the introductory text of section 4.3.3; and
- f. Adding section 4.3.3(c).

The revisions and additions read as follows:

**Appendix Y to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Battery Chargers**

**NOTE 1:** For all battery chargers, including UPSs, compliance with the relevant standard in §430.32(z) or any representation must be based upon results generated under the corresponding appendix listed in the table below:

	<b>Battery Chargers other than UPSs</b>	<b>UPS</b>
<b>Before March 7, 2023</b>	Use appendix Y as codified on either January 1, 2022, or October 11, 2022.	Use appendix Y as codified on either January 1, 2022, or October 11, 2022.
<b>After March 7, 2023 and Before [date 30 days after UPS TP FR Publication]</b>	Use appendix Y as codified on October 11, 2022.	Use appendix Y as codified on October 11, 2022.
<b>After [date 30 days after UPS TP FR Publication] and Before [date 180 days after UPS TP FR publication]</b>	Use appendix Y as codified on either October 11, 2022, or [date 30 days after UPS TP FR publication].	Use appendix Y as codified on either October 11, 2022, or [date 30 days after UPS TP FR publication].
<b>After [date 180 days after UPS TP FR publication] and Before compliance date of any new or amended standards published any time after September 8, 2022</b>	Use appendix Y as codified on [date 30 days after UPS TP FR publication].	Use appendix Y as codified on [date 30 days after UPS TP FR publication].
<b>After compliance date of any new or amended standards published any time after September 8, 2022</b>	Use appendix Y1.	Use appendix Y1.

*0. Incorporation by Reference*

DOE incorporated by reference in §430.3 the entire test standard for IEC 62040-3 Ed.

3.0. However, only enumerated provisions of this standard are applicable to this appendix, as follows. In cases in which there is a conflict, the language of the test procedure in this appendix takes precedence over the referenced test standard.

0.1 IEC 62040-3 Ed. 3.0:

- (a) Section 3.5 Specified values;
- (b) Section 3.5.49 total harmonic distortion

- (c) 5, Electrical conditions, performance and declared values;
- (d) Section 5, Electrical conditions, performance and declared values;
- (e) Section 5.2, UPS input specification, as specified in section 2.27.2 of this appendix;
- (f) Section 5.2.1 - Conditions for normal mode of operation; Clause 5.2.1.a;
- (g) Clause 5.2.1.b;
- (h) Section 5.2.2 - Conditions to be declared by the manufacturer; Clause 5.2.2.k;
- (i) Clause 5.2.2.l;
- (j) Clause 5.2.2.m;
- (k) Section 5.3, UPS output specification; Section 5.3.2, Characteristics to be declared by the manufacturer; Clause 5.3.2.b;
- (l) Clause 5.3.2.c;
- (m) Clause 5.3.2.d;
- (n) Clause 5.3.2.e;
- (o) Section 5.3.4.2, Input dependency AAA;
- (p) Section 6.2, Routine test procedure; Section 6.2.2, Electrical; Section 6.2.2.4, No load, as specified in section 4.3.3(c) of this appendix;
- (q) Section 6.2.2.7, AC input failure, as specified in Note to section 2.27.1 of this appendix;
- (r) Section 6.4, Type test procedure (electrical); Section 6.4.1, Input – AC input power compatibility; Section 6.4.1.2, Steady state input voltage tolerance and VI input independency, as specified in Note to section 2.27.3;
- (s) Section 6.4.1.3, Combined input voltage/frequency tolerance and VFI input independency, as specified in Note to section 2.27.2 of this appendix;
- (t) Annex G – AC input power failure - Test method
- (u) Annex J - UPS efficiency and no load losses – Methods of measurement, as specified in sections 4.2.1, and 4.3.3 of this appendix.



0.2 [Reserved]

\* \* \* \* \*

2.26. *Total harmonic distortion (THD)*, expressed as a percent, is as defined in section 3.5.49 of IEC 62040-3 Ed. 3.0.

2.27. *Uninterruptible power supply or UPS* means a battery charger consisting of a combination of convertors, switches and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of AC input power failure.

2.27.1. *Voltage and frequency dependent UPS or VFD UPS* means a UPS that protects the load from a complete loss of AC input power. The output of a VFD UPS is dependent on changes in voltage and frequency of the AC input power and is not intended to provide additional voltage corrective functions, such as those arising from the use of tapped transformers.

**Note to 2.27.1:** VFD input dependency may be verified by performing the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 3.0 and observing that, at a minimum, the UPS switches from normal mode of operation to battery power while the input is interrupted.

2.27.2. *Voltage and frequency independent UPS or VFI UPS* means a UPS that is independent of AC input power voltage and frequency variations as specified and declared in section 5.2 of IEC 62040-3 Ed. 3.0 and shall protect the load against adverse effects from such variations without discharging the energy storage device.

**Note to 2.27.2:** VFI input dependency may be verified by performing the combined input voltage/frequency tolerance and VFI input independency test in section 6.4.1.3 of

IEC 62040-3 Ed. 3.0 respectively and observing that, at a minimum, the UPS produces an output voltage and frequency within the specified output range when the input voltage is varied by  $\pm 10\%$  of the rated input voltage and the input frequency is varied by  $\pm 2\%$  of the rated input frequency.

2.27.3. Voltage independent UPS or VI UPS means a UPS that protects the load as required for VFD and also from (a) under-voltage applied continuously to the input, and (b) over-voltage applied continuously to the input. The output voltage of a VI UPS shall remain within declared voltage limits (provided by voltage corrective functions, such as those arising from the use of active and/or passive circuits). The output voltage tolerance band shall be narrower than the input voltage tolerance band.

**Note to 2.27.3:** VI input dependency may be verified by performing the steady state input voltage tolerance test in section 6.4.1.2 of IEC 62040-3 Ed. 3.0 and ensuring that the UPS remains in normal mode with the output voltage within the specified output range when the input voltage is varied by  $\pm 10\%$  of the rated input voltage.

\* \* \* \* \*

#### 4.2.1. General Setup

Configure the UPS according to Annex J.2 of IEC 62040-3 Ed. 3.0 with the following additional requirements:

\* \* \* \* \*

#### 4.3.3. Power Measurements and Efficiency Calculations

Measure input and output power of the UUT according to section J.3 of Annex J of IEC 62040-3 Ed. 3.0, or measure the input and output energy of the UUT for efficiency calculations with the following exceptions:

\* \* \* \* \*

(c) For voluntary representations of no-load losses, measure the active power at the UPS input port with no load applied in accordance with section 6.2.2.4 of IEC 62040-3 Ed. 3.0.

\* \* \* \* \*

4. Appendix Y1 to subpart B of part 430 is amended by:

- a. Revising the introductory note;
- b. Adding section 0;
- c. Revising sections 2.27, 2.28, 2.28.1, 2.28.2, and 2.28.3;
- d. Revising the introductory text of section 4.2.1;
- e. Revising the introductory text of section 4.3.3; and
- f. Adding section 4.3.3(c).

The revisions and additions read as follows:

**Appendix Y1 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Battery Chargers**

**NOTE 1:** For all battery chargers, including UPSs, compliance with the relevant standard in § 430.32(z) or any representation must be based upon results generated under the corresponding appendix listed in the table below:

	<b>Battery Chargers other than UPSs</b>	<b>UPS</b>
<b>Before March 7, 2023</b>	Use appendix Y as codified on either January 1, 2022, or October 11, 2022.	Use appendix Y as codified on either January 1, 2022, or October 11, 2022.
<b>After March 7, 2023 and Before [date 30 days after UPS TP FR Publication]</b>	Use appendix Y as codified on October 11, 2022.	Use appendix Y as codified on October 11, 2022.

<b>After [date 30 days after UPS TP FR Publication] and Before [date 180 days after UPS TP FR publication]</b>	Use appendix Y as codified on either October 11, 2022, or [date 30 days after UPS TP FR publication].	Use appendix Y as codified on either October 11, 2022, or [date 30 days after UPS TP FR publication].
<b>After [date 180 days after UPS TP FR publication] and Before compliance date of any new or amended standards published any time after September 8, 2022</b>	Use appendix Y as codified on [date 30 days after UPS TP FR publication].	Use appendix Y as codified on [date 30 days after UPS TP FR publication].
<b>After compliance date of any new or amended standards published any time after September 8, 2022</b>	Use appendix Y1.	Use appendix Y1.

Manufacturers may begin to use appendix Y1 to certify compliance with any new or amended energy conservation standards, published after September 8, 2022, prior to the applicable compliance date for those standards.

### *0. Incorporation by Reference*

DOE incorporated by reference in §430.3 the entire test standard for IEC 62040-3 Ed.

3.0. However, only enumerated provisions of this standard are applicable to this appendix, as follows. In cases in which there is a conflict, the language of the test procedure in this appendix takes precedence over the referenced test standard.

0.1 IEC 62040-3 Ed. 3.0:

- (a) Section 3.5 Specified values;
- (b) Section 3.5.49 total harmonic distortion;
- (c) 5, Electrical conditions, performance and declared values;
- (d) Section 5, Electrical conditions, performance and declared values;
- (e) Section 5.2, UPS input specification, as specified in section 2.28.2 of this appendix;
- (f) Section 5.2.1 - Conditions for normal mode of operation; Clause 5.2.1.a;
- (g) Clause 5.2.1.b;

- (h) Section 5.2.2 - Conditions to be declared by the manufacturer; Clause 5.2.2.k;
- (i) Clause 5.2.2.l;
- (j) Clause 5.2.2.m;
- (k) Section 5.3, UPS output specification; Section 5.3.2, Characteristics to be declared by the manufacturer; Clause 5.3.2.b;
- (l) Clause 5.3.2.c;
- (m) Clause 5.3.2.d;
- (n) Clause 5.3.2.e;
- (o) Section 5.3.4.2, Input dependency AAA;
- (p) Section 6.2, Routine test procedure; Section 6.2.2, Electrical; Section 6.2.2.4, No load, as specified in section 4.3.3(c) of this appendix;
- (q) Section 6.2.2.7, AC input failure, as specified in Note to section 2.28.1 of this appendix;
- (r) Section 6.4, Type test procedure (electrical); Section 6.4.1, Input – AC input power compatibility; Section 6.4.1.2, Steady state input voltage tolerance and VI input independency, as specified in Note to section 2.28.3 of this appendix;
- (s) Section 6.4.1.3, Combined input voltage/frequency tolerance and VFI input independency, as specified in Note to section 2.28.2 of this appendix;
- (t) Annex G – AC input power failure - Test method
- (u) Annex J - UPS efficiency and no load losses – Methods of measurement, as specified in sections 4.2.1 and 4.3.2 of this appendix.

0.2 [Reserved]

\* \* \* \* \*

2.27. *Total harmonic distortion (THD)*, expressed as a percent, is as defined in section 3.5.49 of IEC 62040-3 Ed. 3.0.

2.28. *Uninterruptible power supply or UPS* means a battery charger consisting of a combination of convertors, switches and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of AC input power failure.

2.28.1. *Voltage and frequency dependent UPS or VFD UPS* means a UPS that protects the load from a complete loss of AC input power. The output of a VFD UPS is dependent on changes in voltage and frequency of the AC input power and is not intended to provide additional voltage corrective functions, such as those arising from the use of tapped transformers.

**Note to 2.28.1:** VFD input dependency may be verified by performing the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 3.0 and observing that, at a minimum, the UPS switches from normal mode of operation to battery power while the input is interrupted.

2.28.2. *Voltage and frequency independent UPS or VFI UPS* means a UPS that is independent of AC input power voltage and frequency variations as specified and declared in section 5.2 of IEC 62040-3 Ed. 3.0 and shall protect the load against adverse effects from such variations without discharging the energy storage device.

**Note to 2.28.2:** VFI input dependency may be verified by performing the combined input voltage/frequency tolerance and VFI input independency test in section 6.4.1.3 of IEC 62040-3 Ed. 3.0 respectively and observing that, at a minimum, the UPS produces an output voltage and frequency within the specified output range when the input voltage is varied by  $\pm 10\%$  of the rated input voltage and the input frequency is varied by  $\pm 2\%$  of

the rated input frequency.

2.28.3. *Voltage independent UPS or VI UPS* means a UPS that protects the load as required for VFD and also from (a) under-voltage applied continuously to the input, and (b) over-voltage applied continuously to the input. The output voltage of a VI UPS shall remain within declared voltage limits (provided by voltage corrective functions, such as those arising from the use of active and/or passive circuits). The output voltage tolerance band shall be narrower than the input voltage tolerance band.

**Note to 2.28.3:** VI input dependency may be verified by performing the steady state input voltage tolerance test in section 6.4.1.2 of IEC 62040-3 Ed. 3.0 and ensuring that the UPS remains in normal mode with the output voltage within the specified output range when the input voltage is varied by  $\pm 10\%$  of the rated input voltage.

\* \* \* \* \*

#### 4.2.1. General Setup

Configure the UPS according to Annex J.2 of IEC 62040-3 Ed. 3.0 with the following additional requirements:

\* \* \* \* \*

#### 4.3.3. Power Measurements and Efficiency Calculations

Measure input and output power of the UUT according to section J.3 of Annex J of IEC 62040-3 Ed. 3.0, or measure the input and output energy of the UUT for efficiency calculations with the following exceptions:

\* \* \* \* \*

(c) For voluntary representations of no-load losses, measure the active power at the UPS input port with no load applied in accordance with section 6.2.2.4 of IEC 62040-3 Ed. 3.0.